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ABSTRACT

This colloquium on the Department of Educational Technology at the Twente University of Technology (The Netherlands) begins with a discussion of the differences between the program at Twente University and programs in education at other universities in the Netherlands. The second section reviews some basics of an applied approach to education, and the projected growth of the department from 1980-89 is summarized in the third section. The fourth section describes the curriculum, which consists of two phases: the first year is filled with clusters of conceptually interrelated courses (educational science, research methods and techniques, educational technology, social science, educational computer use, philosophy of education, practical skills, social and communicative skills, and technical sciences); and the second part, which takes on or two years, offers a differentiation program in an area of specialization (educational management, instructional technology, curriculum technology, or educational instrumentation). The fifth section outlines the themes serving as the organizational basis for departmental research: (1) strategies for curriculum development; (2) efficiency in education; (3) educational information systems; (4) examination techniques; and (5) educational instrumentation. Guidelines for entering and leaving the program are discussed in the final section. Comparisons with the program of the University of California at Los Angeles Graduate School of Education are presented throughout. Four documentation resources (in Dutch) are listed. (MES)

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I.P.F. de Diana

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Twente University of Technology, Department of Applied Education, December 1980

Voor Nederlandse lezers

Dit colloquium is gehouden voor de UCLA GRADUATE SCHOOL OF EDUCATION, TE LOS ANGELES. De vergelijkingen die gemaakt zijn tussen Toegepaste Onderwijskunde (Department of EDUCATIONAL TECHNOLOGY) en de GRADUATE SCHOOL of EDUCATION, hadden met name het bevorderen van een gerichte discussie tot doel.

Om een beter inzicht te verkrijgen in de UCLA Graduate School of Education, wordt U aangeraden kennis te nemen van het Twents onderwijskundig Bulletin No. 11, de "UCLA Graduate School of Education", te Los Angeles.

1. Introduction

Choosing "The Department of Educational Technology at the Twente University of Technology, The Netherlands" as topic for a colloquium at the UCLA Graduate School of Education, seemed appropriate to me for several reasons.

The first one is the fact that I have been one of the developers of the blueprints for the new department which will be open to students, starting in fall 1981. Designing the Department can be considered to have been one of my main activities during the last two and a half year and this colloquium offers an opportunity therefore to give you some insight into my activities in that period.

The second is that the Department of Educational Technology at Twente University of Technology will be by far the biggest Department of Education in the Netherlands. As I have understood that the UCLA Graduate School of Education is one of the biggest of its kind in the U.S.A., a presentation of our department for this audience and drawing some comparisons with the UCLA Graduate School seems worthwhile -- because it might offer some points of reflection about how educationalists are trained at two big institutions in two different countries of the Western world.

In this colloquium I hope to give you some insight into the structure of our department and how we go about training students to become graduates (as well as undergraduates) in Education.

2. Programs in Education at Universities in the Netherlands

In several aspects the Department of Educational Technology and the programs it will offer differ from programs in Education as given at other Universities in the Netherlands.*

In the first place, the Department offers a fully integrated undergraduate-graduate program in Education, in a way that might be compared with the way Law or Medicine is generally taught at the University.
The programs in Education at the other Dutch Universities are all graduate programs based upon an undergraduate program either in Pedagogy, Psychology or Sociology. Secondly, our program fully integrates elements from the so-

*Programs in Education are given at the Universities of Groningen, Utrecht, Nijmegen and Leiden.

called "basic disciplines" (Pedagogy, Psychology, and Sociology) into the study of Education. The programs at the other universities approach education from one of these basic disciplines.
This has as one of its consequences that these programs are heavily coloured by the "basic discipline" on which they are based.

In the third place, there is a difference in the conception of Education between the graduate programs offered at the other Dutch universities and the integrated undergraduate-graduate prggram offered at Twente: historically, the different approaches to the study of Education in the Netherlands stem basically from a theoretical approach to Education, in which the methods and ideas of the leading "basic discipline" are used for studying educational phenomena.

In Twente we do not approach Education basically from a theoretical conception, stemming from a basic discipline, rather we try to bridge the distance that often has become manifest between Educational theory and problems in educational reality.
We try to build this bridge not by acting as permanently present counselors for desperate educators, but by developing an approach to Eduction that we call "applied".

"Applied" from our point of view stands for an approach that is marked by an integration of selected elements from several social sciences and education, combined with a selection of methods and procedures from mathematical and several technical sciences, and that is directed at solving certain classes of educational problems.

The solving of classes of educational problems encompasses a series of activities, such as problem identification, problem conceptualization, design of a solution, evaluation of a solution. Comprised together, we call these activities the "educational problem solving cycle".

The last difference between our department and the other Dutch Education Departments that I would like to mention, pertains to size.
By the time that our department will be full-grown, in 1989, it will have some 50 faculty members, some 30 staf-personnel and have enrolled some 400 students. The other departments, that are by now already fully developed, do not have by far that size.

If I try to place the UCLA Graduate School of Education in the dimensions I have used for making a distinction between our department and the other Dutch Education Departments, I come up with the following positions.

1. The UCLA Graduate School of Education offers only a Graduate program, undergraduates entering the program come from different fields of academic study.

2. In regard to what we call the basic disciplines, UCLA's Graduate School seems to take an intermediate position between our department and the other Dutch Education Departments. The Graduate School does not build exclusively upon one basic discipline such as psychology, but builds rather like Twente upon a group of basic disciplines. On the other side, I have the impression that the diffusion and dissolving of the basic disciplines into Education doesn't go as far as in Twente. An illustration of this is given by the Graduate School's specialization areas in which the basic disciplines are still clearly discernible.

3. As for a location on the dimension theoretical oriented-problem solving oriented, it needs to be pointed out, I think, that the UCLA Graduate School grew from a teacher training institution. In my opinion it still has a strongly practical orientation. But whereas we are trying to bridge the distance between a theoretical approach to Education and practical educational problems, the Graduate School is, in my opinion, growing slowly towards a more theoretic approach to Education.

3. Some basics of an applied approach to Education

As I have pointed out to you, "applied" stands for an integration of elements from different sciences, and an approach to education that is aimed as the solving of classes of educational problems. In this respect, several basic points of view that we held must be mentioned as they form starting points for our curriculum and research activities.

1. In the "educational problem solving cycle" we see a unifying starting point for the different sciences that are involved in the construction of the curriculum we will offer. The cycle has as its main phases: problem analysis, design of a solution, realization of the solution, evaluation of the solution and implementation of the solution. In each of these phases, the involved sciences may make a contribution, be it either a methodological one or a content based.

In the form of case studies, the students will be confronted with each of the different phases of this cycle, in each of which selected elements from the involved sciences will be presented.

If I make a comparison with the Graduate School, then it is clear, that the problem solving cycle doesn't appear to be such a prominent concept there.

2. We take the point of view that a fair knowledge of some formal methods, such as some stemming from mathematics and computer science is required in order to be able to solve classes of educational problems.

   This has as one of its consequences, that a good deal of attention is given in our curriculum to these methods; furthermore they are presented to the students integrated with the areas of application.

   Even though formal methods get a thorough and extensive deal of attention in the Graduate School, these methods are of a mathematical kind. Formal methods stemming from, for instance, computer science, do not play a big role in the Graduate program.

3. It is our opinion that media in the near future will play a increasingly strong role in the educational process.

   Media defined in a broad sense, so it includes among others written materials, AV-media and computers.
   Not only do we give students in our curriculum a fair amount of time to become acquainted with the use and applications of media in educational settings, but we have also planned to establish a media specialization group (that we call "Educational Instrumentation" specialization group) and an Educational Laboratory.

   The Educational Laboratory is a learning resource and research center. Both students and faculty members will use this laboratory heavily. The technical staff-personnel of our department will all be appointed in and work in this laboratory.

As it is projected, the laboratory consists of a medium sized AV-media center. The center is connected to the advanced AV-center of our University. Furthermore, this AV-media center will contain a multi-media library and media workshops.

The laboratory is to have its own computer network, that we plan to consist of a Digital PDP 11/44 computer, coupled to some 8 microcomputers and a group of terminals. Throughout the laboratory there will be connections for either microcomputers or terminals to the PDP 11/44.

The PDP itself will be connected with the university's DEC 10 mainframe or with a Cyber computer that is situated in the University of Groningen in the Netherlands.

All these facilities will be created for both instructional and research purposes. For specific research purposes we plan among others to couple elements from the AV-system with microcomputers.

4. Growth of the Department

As I have said earlier, when full grown, by 1989, our Department will have some 50 faculty members, 30 staff-personnel and some 400 enrolled students. However, the actual development only began last year, when our Secretary of Education (Minister van Onderwijs), dr. A. Pais, approved of our plans and reserved the needed funds for us.

In the coming years we will know several growth curves; one of them is the inflow of students. In fall 1981, we will have our first students, some 50. Slowly, this number will increase to a yearly inflow of 75 students. Seventy-five is the capacity limit of our Department, on which its structure has been designed.

Another growth curve is the inflow of faculty. Right now there are only seven of them, next year some seventeen and increasing yearly by some three to five, we will end up with some fifty.

Additional growth curves pertain to personnel, equipment, housing etc.
I will bypass them and tell you something about our curriculum.

5. The curriculum

In the Netherlands our Ministry of Education has planned for all university programs to be organized in a so called "Two Phase Structure" (1). This means that the first phase, leading up to a certificate that is the equivalent of a masters degree, can be followed by a second phase in which a specialization is possible for either a professional research or teaching career. Admittance to the second phase will only be possible for a part of the graduates from the first phase. The second phase does not lead up to an academic degree; after completion a certificate is given.

Our Department of Educational Technology will function in this structure and our curriculum is organized concordantly (2).
The first phase of our program consists of an undergraduate program and a graduate program. The undergraduate program is to a large extent the same for all students. It consists of two parts. The first part that takes up one year is filled completely with what we call "streams". A stream is a cluster of courses (we call them "blocks") that are conceptually interrelated. In all we have nine streams. Scheme 1 gives an overview of them

1. Educational Science	970 hrs.
2. (Research) Methods and Techniques (including mathematics)	789 hrs.
3. Educational Technology	750 hrs.
4. Social Sciences (mainly elements from Psychology, Pedagogy and Sociology)	700 hrs.
5. Educational Computer Use	370 hrs.
6. Philosophy of Education	200 hrs.
7. Practical skills (e.g. information retrieval techniques)	190 hrs.
8. Social and Communicative skills	140 hrs.
9. Technical sciences (elements of physics, optics, electronics, ergonomics, among others)	140 hrs.

Scheme 1. The nine streams and the amount of hours they occupy in the first phase of the curriculum. (Hours indicate hours of instructional and study time needed by the average student, taken together).

As an example of one of these streams and to elucidate the way building blocks relate to the stream concept. I will elaborate a little upon one of these streams.
Scheme 2 gives you an overview of the blocks in stream no. 5 "Educational Computer Use".

Block 1:	Introduction in educational computer use. (General introduction, basic terminology and concepts).	40 hrs.
Block 2:	Introduction to programming. (From problem to instructional sequence).	65 hrs.
Block 3:	Dec-10 use. (Handling the mainframe of our university).	35 hrs.
Block 4:	PDP 11/44 and microcomputer use (How to work with mini's and micro's).	60 hrs.
Block 5:	Programming in Pascal (Writing computer programs in the Pascal language).	40 hrs.
Block 6:	SPSS (Statistical Package for the Social Sciences).	60 hrs.
Block 7:	CBL programming and applications (Essentials of Computer Based Learning).	40 hrs.
Block 8:	Modes of educational computer use (Among others computer based simulation, database building and use, computer managed instruction).	30 hrs.

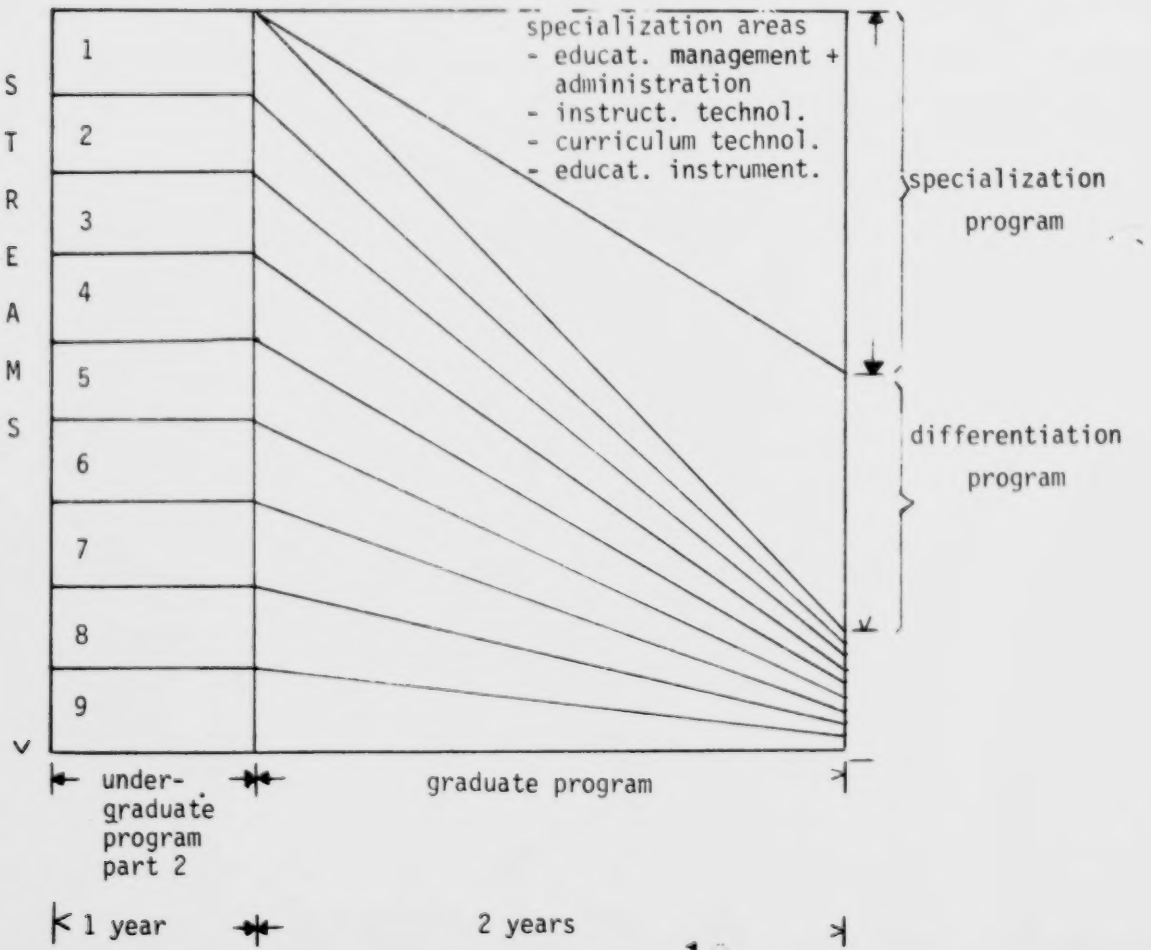
Scheme 2. The blocks of the stream "Educational Computer Use" (Hours indicate hours of instructional and study time needed for the average student, taken together).

As you can see from scheme 2, the blocks that make up the stream "Educational Computer Use" attempt to develop a fair amount of computer literacy in the students.
Starting with an introduction in computer use and programming, gradually their knowledge develops by working with small computers and mainframes and they will experience several ways of putting the computer to use in education.

The first part of the undergraduate program, lasting one year, is completely filled with elements from these nine streams. The first part counts 1600 hours of study time (instructional time and individual working time) for the average student.

In scheme 3 you can see our undergraduate program part 2 and our graduate program. The undergraduate program part 2 takes more or less one and a half additional year, the graduate program likewise one and a half year.

Scheme 3



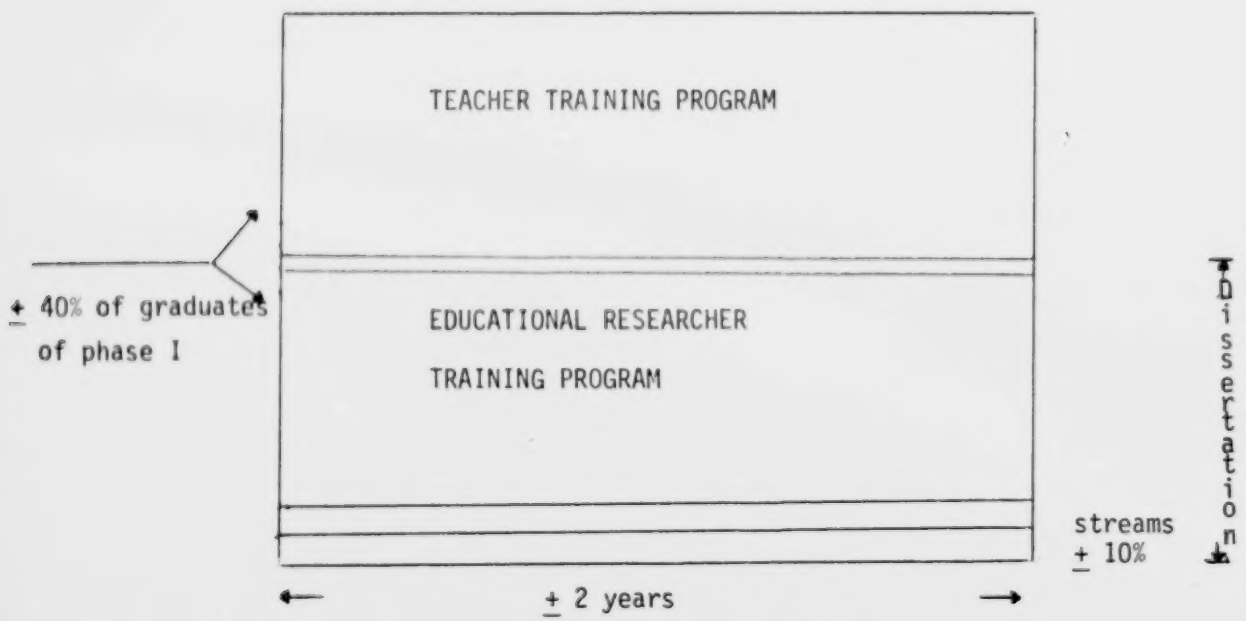
The undergraduate program part 2 is filled with elements from the streams.
The graduate program offers a differentiation program and elements of the four specialization areas too.
The specialization areas are the respective working areas of our specialization groups, viz. educational management (and administration), instructional technology, curriculum technology and (educational) instrumentation.

The differentiation program offers the students , given certain restrictions, a freedom of choice to pursue in depth elements from the specialization areas. In this the students are supervised and guided by faculty members.

Just as in the undergraduate program part 2, there are in the graduate program elements from the streams, from the specialization areas and a differentiation program. Here however there is a clear emphasis on the specialization areas. A student has to make a choice for one area, do a literature survey, to do some fieldwork and to carry out a small research project in that area. The writing, field- and research activities are guided and supervised by a faculty member from the specialization group he has chosen.

In the second phase of the curriculum (as it is projected by now) there is an estimated inflow of round about 40% of the graduates from phase 1.

Scheme 4



Graduate Program Part 2

They can enter either a teacher training program or an educational research specialist program. The teacher training program will give the credentials to teach Education at teacher training colleges, the educational research specialist program is aimed at developing highly qualified educational researchers.
The second phase of the program will last between one and two years. It is expected that students graduating from the educational research specialist program will write a dissertation after the second phase, based upon their work done in the second phase.

The responsibility for the carrying out of the curriculum is located at the specialization groups. Each one of these specialization groups has streams and building blocks alloted to them by our Departmental Council.
Likewise the responsibility for specialization activities, carried out by the individual student is placed by the respective specialization group.

As the specialization part of the graduate program takes only $\pm$ 25% of the total time in the graduate program, the students can get a broad knowledge of Education as well as some in depth knowledge of one specialization area.

In the second phase of the curriculum, at least for the research program, the specialization group will be dominant for the activities of the student.

Some comparisons with UCLA's Graduate School might be drawn:

1. The idea of continuous "streams" running through the undergraduate program up into the graduate program is specific for Twente.
2. A differentiation program such as offered in Twente's program is not offered at UCLA's Graduate School.
3. There is no separation in Twente, in the graduate program between a Ph.D. and an Ed.D. program.
4. Teacher training for elementary school and secondary education is not offered in Twente.
   In the Netherlands, elementary school teachers are not trained at the University. Secondary education teachers are trained in the Netherlands at special teacher training institutions at the undergraduate level, or educated as subject matter specialists at the University with some extra courses in didactics.

6. The Research

The research program that is carried out in the Department of Educational Technology is organized in five themes (3). To a high degree these themes coincide with the working areas of the specialization gropps.

A short description of our themes.

1. Strategies for curriculum development

The preliminary research topics here are:

- competency and discipline based approaches to curriculum development
- evaluation procedures in curriculum development
- media use in curricula.

2. Efficiency in education

The central idea of this theme is to study how educational resources can be used in an optimal way.

The preliminary research topics are:

- approaches to individualized instruction
- teacher behavior and learning environment
- instructional design
- selection and placement (problems and procedures).

3. Educational information systems

The central idea here is to study among other things the design, construction and use of educational databases.

4. Examination techniques

The preliminary research topics are:

- skills and aptitude testing
- decision problems
- item banking.

5. Educational instrumentation

The study of the use of AV-media and computers for educational purposes is the central idea here.

The preliminary research topics are:

- modes of interactive instrumentation
- standardization of educational instrumentation; both of procedures and of products
- learning environments (especially the physical aspect)
- the evaluation of new media technical developments for educational purposes.

As you probably have guessed, there is a clear connection between the theme Educational Instrumentation and the Instrumentation specialization group; between the themes Examination Techniques and Efficiency in Education and the Instructional Technology specialization group; between the theme Strategies for Curriculum Development and the Curriculum Technology specialization group and between the theme Educational Information Systems and the Educational Management specialization group.

The themes serve as demarcators for research projects in that sense, that some 90% of the research projects in our department have to be carried out in the conceptual space allocated by the theme descriptions.

This heavy emphasis on themes as guiding principles for research projects has several reasons and/or functions.

1. The research projects are carried out in a well defined area. Wild growth is therefore difficult to occur.
2. As the themes are planned as working areas for a period of time up to e.g. 10 years, in each of them in time a body-of-knowledge can be built up from the projects that were carried out in its conceptual space.
3. The themes serve as specialization areas in the Netherlands funded research situation.
   As gradually a body-of-knowledge will be build up in respect to the conceptual space defined by the themes, this will have as a consequence that our chances of getting extramural research funds for a research project will be higher if we have to compete for funds for a project located in one of our specialization areas.
   And even though in the Netherlands each year some 29% of our governmental budget is spend on Education and Science, the funding of educational research is not heavy. This means that there is a fair amount of competition for extramural research funds.

4. Our Department of Sciences takes the position that in near future there will be a division of focal research areas over our institutions of higher education (4). This holds for educational research as well. The consequence of it is that educational research groups or centers that are aligned with our Universities or form a part of them have to define their own focal areas. The themes define our foci.

Research projects develop in the context of the theme to which they belong. In daily practice this means that a faculty member, working in a theme generates a proposal for a research project that has to be approved. Approval in the Department (which has to be given by a Departmental Research Committee) is dependent on a set of criteria that are applied to the proposal. Besides that, the proposal has to fit in one of the themes, a research project proposal has to be aligned with the basics of our applied approach to education, it should in the long run be extramurally fundable and it should have social relevance.

Some comparisons with the UCLA Graduate School of Education.

1. The hierarchical relationship between themes and research projects is not in existance, at least to my knowledge, in the Graduate School.
2. A formal project proposal approach in which the proposal has to be approved of by a Research Committee that applies a set of criteria is also not in existance in UCLA, at least, I have not noticed it.
3. There is no difference I think in the emphasis that both Twente and the Graduate School lay on extramural funding. Long range theme planning aligned with it seems to be particular to Twente.

After having given some insight in our basics, our hardware emphasis, our Educational Laboratory, Curriculum and Research themes, I would like to finish my presentation with telling you something about entering our program and the prospects for the future if you have graduated from it.

7. Entering and leaving the Department

All students that apply for a study at our Department must be graduated from the Atheneum or the Gymnasium (two types of Dutch schools preparing for University studies). To enter our program students should have taken in their school programs for the 11th and 12th grade classes in one or more foreign languages and mathematics (up to calculus of more than one variable).

As our Department of Education has allowed us for the first year an inflow of fifty students, a selection needs to be made from the applicants if their number exceeds fifty. Typically in the Netherlands this is done by a random selection procedure from the population of qualified applicants.

All students that want to enter our graduate program need to have had an adequate undergraduate program. In practice this will mean, given the special situation of our Department in the Netherlands, that almost all our students in the graduate program will come from our own undergraduate program.

As for the second phase of our program, all students need to have a Masters Degree in Education either from Twente University of from one of the other Universities that offer programs in Education.
As we have only a limited inflow capacity for the second phase, a selection procedure will be needed. Here we will probably not use a random selection procedure but we will probably apply comparative grading techniques.

Two studies done by us indicate that graduates from our programme will probably not have too much difficulty finding a job. The yearly placement capacity in the Netherlands for educational scientists exceeds the outflow of our Department well up till the end of the 80's.

We do not aim as regards placement possibilities for our graduates at a special class or classes of jobs, e.g. media specialists. Rather we hope to give our students a program and a training that is sufficiently broad and deep in order for them to make it possible to enter into the whole variety of positions held in the Netherlands by educational scientists.

SOME DOCUMENTATION RESOURCES

1. Twee-fasenstructuur Wetenschappelijk Onderwijs.
   Ontwerp van een wet.
   Staatsuitgeverij, 's-Gravenhage, 1980.

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   Grondslagen, bouwstenen en vorm van het onderwijsprogramma van Toegepast Onderwijskunde.
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   Staatsuitgeverij, 's-Gravenhage, 1979.